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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,590	11/10/2005	Stephen Robert Tennison	MAST-6-PCT	2907

7590 12/08/2008

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EXAMINER	
MILLER, DANIEL H	
ART UNIT	PAPER NUMBER
1794	

MAIL DATE	DELIVERY MODE
12/08/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,590	TENNISON ET AL.	
	Examiner	Art Unit	
	DANIEL MILLER	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/20/2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *60-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *60-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 60-63, 65-67, 69, 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satchell (EP 0254551) in view of PCT/GB 2002/003259 and Krause (US 4,220,553).

3. Satchell teaches a porous phenolic resin article made by the method wherein a partially cured phenolic resin solid is ground to form particles and formed (shaped) into solid product that is subsequently sintered to form a stable sintered product (claim 1 ref.).

4. The phenolic resin can be a novolak resin (claim 5 ref.)

5. The carbon product can comprise a polyethylene glycol additive (claim 11 ref.).

6. The article is carbonized at a temperature above 600 degrees C (see ref. claim 14), overlapping applicant's claimed range.

7. Satchell teaches the article is useful for filters or membranes including carbon composites (page 2 lines 1-12), but does not specifically teach the addition of particles of a secondary material.

8. Patent application PCT/GB 2002/003259 discloses an improved method of forming complex carbon forms by sintering partially cured phenolic resin powders. In this route the novolak resin precursor is partially cured using hexamethylene tetramine (Hexamine) to an extent sufficient to just convert the thermoplastic novolak to a thermoset resin. The resin is then milled to a powder with a particle size of between 5 and 500 microns, mixed with an extrusion aid such as methyl cellulose to form a dough, and extruded to produce complex monolith structures which, after drying, can be carbonized and activated. The formed carbons have a very uniform structure, exhibit good thermal and electrical conductivity and can be produced with surface areas up to around 1000m2/g.

The only drawback to this production route is that the phenolic resin derived carbons can only be produced with pores of approximately 0.6-1.0nm, overlapping applicant's claimed range. Patent application PCT/GB01/03560 discloses a method for the production of a meso/maeroporous monolithic carbon by using a meso/maeroporous phenolic resin, produced according to patent EP 0 254 551, in conjunction with novolak phenolic resin as a binder (see admission by applicant instant specification).

9. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two teachings because both are the substantially the same method using substantially similar materials to form a similar product for a similar purpose and in order to provide a more uniform structure that exhibits good thermal and electrical conductivity with high surface area

10. Krause teaches a filter-drier unit formed from porous blocks comprising granular (particulate) adsorbent materials such as zeolite molecular sieves, activated carbon, alumina, silica gel, or the like and wherein the granules have been adhered to each other by various binders (column 1 line 25-35). Krause further teaches that the binder material is a phenolic resin (claim 1 ref.). The solid porous filter comprising granular material, as stated above, uses the granular material to filter out particles of foreign material and adsorbing water acids and other impurities (column 1 line 7-18).

11. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the granular material taught by Krause, mixed with the phenolic rein particles (taught by Satchell), since Krause teaches mixing phenolic resin and secondary particulate material in order to provide a porous filter that is more advantageously useful for filtering out particles of foreign matter and adsorbing water acids and other impurities.

12. Given the substantial similarity in the structure and process of Satchell in view of Krause to applicants claimed invention the article and resin and secondary components are considered to have substantially similar functionality to that claimed by applicant. No patentable distinction is seen. The addition of the secondary particles to the resin would necessarily alter the thermal and electrical properties of the composite given the secondary particles comprise compositionally different material with different thermal and electrical properties.

13. Regarding claim 67, the milling processes claimed are well known in the art and do not represent a patentable distinction given they would be expected to be one of several that one of ordinary skill would chose to employ.

14. Regarding claims 61 and 72, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed particle size of the ground resin and the percentage of secondary material, by optimizing the strengthening or filtering applications of the additive material while in turn providing a particle size of the cured resin that would provide an optimal porosity and surface area with the greatest strength of the material and adhesion of the resin. The optimization would only amount to routine experimentation of one of ordinary skill and does not represent a patentable distinction.

15.

16. Claims 60-63, 65-67, 69, 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satchell (EP 0254551) in view of PCT/GB 2002/003259, further in view of Van der Smissen (US 4,677,096).

17. EP 0 254 551 gives details of methods of forming the porous carbons and its contents are included herein by reference. The process comprises (a) partially curing a phenolic resin to a solid, (b) grinding the solid to form particles, (c) forming the resulting ground product into a dough and extruding to a pre-determined shape at a pressure in

the range 0 to 20 MPa, (d) sintering the shaped solid so as to produce a form-stable sintered product. The sintered product can then be activated.

18. Satchell also teaches a porous phenolic resin article made by the method wherein a partially cured phenolic resin solid is ground to form particles and formed (shaped) into solid product that is subsequently sintered to form a stable sintered product (claim 1 ref.).

19. The phenolic resin can be a novolak resin (claim 5 ref.)

20. The carbon product can comprise a polyethylene glycol additive (claim 11 ref.).

21. The article is carbonized at a temperature above 600 degrees C (see ref. claim 14), overlapping applicant's claimed range.

22. Patent application PCT/GB 2002/003259 discloses an improved method of forming complex carbon forms by sintering partially cured phenolic resin powders. In this route the novolak resin precursor is partially cured using hexamethylene tetramine (Hexamine) to an extent sufficient to just convert the thermoplastic novolak to a thermoset resin. The resin is then milled to a powder with a particle size of between 5 and 500 microns, mixed with an extrusion aid such as methyl cellulose to form a dough, and extruded to produce complex monolith structures which, after drying, can be carbonized and activated. The formed carbons have a very uniform structure, exhibit good thermal and electrical conductivity and can be produced with surface areas up to around 1000m2/g.

The only drawback to this production route is that the phenolic resin derived carbons can only be produced with pores of approximately 0.6-1.0nm, overlapping applicant's

claimed range. Patent application PCT/GB01/03560 discloses a method for the production of a meso/maeroporous monolithic carbon by using a meso/maeroporous phenolic resin, produced according to patent EP 0 254 551, in conjunction with novolak phenolic resin as a binder (see admission by applicant instant specification).

23. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two teachings because both are the substantially the same method using substantially similar materials to form a similar product for a similar purpose and in order to provide a more uniform structure that exhibits good thermal and electrical conductivity with high surface area.

24. Satchell teaches the article is useful for filters or membranes including carbon composites (page 2 lines 1-12), but does not specifically teach the addition of particles of a secondary material.

25. Van der Smissen teaches an air filter comprising a porous substrate formed form activated carbon and impregnated with aluminum or copper (column 2 lines 30-45). The aluminum and copper are impregnated into the filter so that the filter can be adapted to filter different impurities in the air (column 2 lines 45-50).

26. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the particles into the copper or aluminum particles of phenolic resin as claimed in order to provide a filter that can be adapted to filter different impurities in the air.

27. Given the substantial similarity in the structure and process of Satchell in view of Smissen to applicants claimed invention the article and resin and secondary

components are considered to have substantially similar functionality to that claimed by applicant. No patentable distinction is seen. The addition of the secondary particles to the resin would necessarily alter the thermal and electrical properties of the composite given the secondary particles comprise compositionally different material with different thermal and electrical properties.

28. Regarding claim 67, the milling processes claimed are well known in the art and do not represent a patentable distinction given they would be expected to be one of several that one of ordinary skill would chose to employ.

29. Regarding claims 61 and 72, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed particle size of the ground resin and the percentage of secondary material, by optimizing the strengthening or filtering applications of the additive material while in turn providing a particle size of the cured resin that would provide an optimal porosity and surface area with the greatest strength of the material and adhesion of the resin. The optimization would only amount to routine experimentation of one of ordinary skill and does not represent a patentable distinction.

30. Claims 70 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satchell (EP 0254551) in view of PCT/GB 2002/003259 and Krause (US 4,220,553), and further in view of Noack (US 7,014,681).

31. Satchell in view of PCT/GB 2002/003259 and Krause, discussed above, do not teach a carbide secondary component formed during the sintering step or the step of further activating the sintered material with steam or carbon dioxide.

32. Noack teaches a carbon based porous filter that can have Si-based components added to it to form Silicon Carbide during heating processes (column 10 lines 30-55). The membrane is flexible and is advantageous for gas separation applications (column 1 lines 5-10).

33. If the Si-based compounds are added to Satchell in view of Krause as a secondary component they would necessarily form carbide during the sintering process in a manner substantially similar to that taught by Noack.

34. Noack further teaches pore size homogeneity, and activation of the carbon based filter is known to be desired by post treating the filter with H2O vapor (steam) or CO2 (see column 8 lines 45-60).

35. Regarding claim 63, Satchell teaches that the pore size can be controlled by altering the particle size of the resin (page 3 lines 55-60 to page 4 lines 1-5). While Noack teaches that pore size and homogeneity, can be further controlled by post treating the filter with H2O vapor (steam) or CO2 (see column 8 lines 45-60). It would have been obvious to provide a pore size within applicant's claimed range, as PCT/GB 2002/003259 teaches an overlapping range, or any desired range, based on the above teachings of Satchell and Noack dependent upon the particular application of the filters or membranes. No patentable distinction is seen.

36. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide secondary components including Si-based carbide forming compounds in Satchell in view of Krause, as taught by Noack, In order to provide a flexible filter that is advantageous for gas separation applications (column 1 lines 5-10). It would further have been obvious to provide a post treatment process of Satchell in view of Krause in order to control pore size and homogeneity, and activate the carbon based filter via the post treatment of the filter with H2O vapor (steam) or CO2 (see column 8 lines 45-60), as taught by Noack, improving the functionality of the filter.

37. Claims 64 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satchell (EP 0254551) in view of PCT/GB 2002/003259 and Krause (US 4,220,553), and further in view of Chen (US 5,882,517).

Satchell in view of PCT/GB 2002/003259 and Krause, discussed above, do not teach a Polyethylene Oxide added to the product.

Chen teaches adding (PEO) Polyethylene Oxide to a porous carbon structure is known in the art to be beneficial as a strengthening agent for the porous structure (see abstract and column 5 to column 6 lines 5-10).

Chen also teaches the addition of carbon particles (powder), which would include graphite, and graphite fibers specifically as secondary components (see column 6 lines 50-65).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide Polyethylene Oxide added to the product of Satchell (EP 0254551) in view of PCT/GB 2002/003259 and Krause (US 4,220,553), because one of ordinary skill would expect that it would strengthen the material of the porous structures as in Chen.
It would have been obvious to one of ordinary skill in the art at the time of the invention to provide graphite powder added to the product of Satchell (EP 0254551) in view of PCT/GB 2002/003259 and Krause (US 4,220,553), because one of ordinary skill would expect that it would strengthen the material, and provide substantially similar benefits to that of Chen and Satchel which teaches an activated carbon, of the porous structures as being substantially similar to the disclosed material of Chen.

Response to Arguments

38. Applicant's arguments with respect to claims 60-72 have been considered but are moot in view of the new ground(s) of rejection. Wherein applicant's amendment to the claim language necessitated the amendment to the rejection.

Conclusion

39. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Daniel Miller

/KEITH D. HENDRICKS/

Supervisory Patent Examiner, Art Unit 1794